In re Application of: Aharon J. AGRANAT
Serial No.: 10/542,923
Filed: July 21, 2005
Office Action Mailing Date: December 2, 2008

Examiner: Shi K. LI
Group Art Unit: 2613
Attorney Docket: 29885

In the Claims:

1. (Currently Amended) A laser power grid, comprising:

a ~~first~~ plurality of continuous-work (cw) laser sources, for generating a ~~first~~ plurality of light propagations, each of said light propagations being distinct by its wavelength;

a laser distribution grid, formed as at least one optical fiber, optically coupled to said ~~first~~ plurality of cw laser sources, for transmitting said ~~first~~ plurality of light propagations; and

a ~~second~~ plurality of optical-switch arrays, each of said optical-switch arrays serving a processing element (PE), comprising at least one optical switch, coupled to said laser distribution grid, and adapted for deflecting a predetermined portion of a single one of said light propagations, distinct by its wavelength, responsive to an input signal so that another PE served by another of said plurality of optical-switch arrays is designated,

wherein said input signal specifies which one of said light propagations, distinct by its wavelength, is desired, at each of said optical-switch arrays,

wherein each of said optical-switch arrays is adapted to deflect light propagations of different wavelengths, responsive to different input signals,

and wherein, the remainder portion of said single one of said light propagations and the remainder of said ~~first~~ plurality of light propagations continue to propagate through said laser distribution grid, to the other ones of said ~~second~~ plurality of optical-switch arrays, where predetermined portions of other light propagations, distinct by their wavelength, are deflected, responsive to other input signals.

2. (Withdrawn) The laser power grid of claim 1, wherein said laser distribution grid is formed as a plurality of optical fibers.

3. (Original) The laser power grid of claim 1, wherein said laser distribution grid is formed as a multi-mode fiber.

4. (Original) The laser power grid of claim 1, wherein said laser distribution grid is formed as a single-mode fiber.

5. (Original) The laser power grid of claim 1, wherein said at least one optical switch is an electroholographic switch.

6. (Original) The laser power grid of claim 5, wherein said at least one optical switch is operative by electric field multiplexing (EFM).

7. (Currently Amended) The laser power grid of claim 1, wherein said optical-switch array includes a plurality of optical switches, equal to said ~~first~~ plurality of light propagations, each optical switch being optically coupled to said laser distribution grid, and each optical switch being adapted for deflecting a single one of said light propagations of said distinct wavelength, responsive to said input signal.

8. (Currently Amended) The laser power grid of claim 7, wherein said a laser distribution grid is formed as one optical fiber, which is coupled to said ~~first~~ plurality of optical switches, with an optical wavelength demultiplexer upstream of said optical-switch array and an optical coupler downstream of said optical-switch array.

9. (Original) The laser power grid of claim 8, comprising an optical coupler for coupling optical fibers along the deflected course of the light propagation.

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10. (Original) The laser power grid of claim 1, wherein said each optical switch is adapted to deflect a predetermined portion of said single light propagation of said distinct wavelength.

11. (Original) The laser power grid of claim 1, wherein said laser sources are fixed-wavelength laser sources.

12. (Original) The laser power grid of claim 1, wherein said laser sources are tunable laser sources.

13. (Currently Amended) A data network, comprising:

a laser power grid, which comprises:

a ~~first~~ plurality of continuous-work (cw) laser sources, for generating a ~~first~~ plurality of light propagations, each of said light propagations being distinct by its wavelength;

a laser distribution grid, formed as at least one optical fiber, optically coupled to said ~~first~~ plurality of cw laser sources, for transmitting said ~~first~~ plurality of light propagations; and

a ~~second~~ plurality of optical-switch arrays, each of said optical-switch arrays serving a processing element (PE), comprising at least one optical switch, coupled to said laser distribution grid, and adapted for deflecting a predetermined portion of a single one of said light propagations, distinct by its wavelength, responsive to an input signal so that another PE served by another of said plurality of optical-switch arrays is designated;

a ~~second~~ plurality of PEs, each electronically coupled to one of said ~~second~~ plurality of optical-switch arrays, for providing said input signal, for deflecting said single one of said plurality of light propagations~~propagation~~ of said distinct wavelength; and

a ~~second~~ plurality of optical modulators, each electronically coupled to one of said ~~second~~ plurality of PEs and optically coupled to said one of said optical-switch arrays, associated with said PE, for modulating said single light propagation of said distinct wavelength, responsive to an electronic information of said PE, for forming an optical data packet of a distinct wavelength for transmission to a PE configured to receive said distinct wavelength~~, associated with said PE~~.

14. (Withdrawn) The data network of claim 13, adapted for single-wavelength data transmission.

15. (Original) The data network of claim 13, comprising an optical coupler, for receiving data packets from said modulators and for coupling said data packets to an optical fiber, for wavelength division multiplexing (WDM).

16. (Original) The data network of claim 15, wherein said WDM is a coarse wavelength division multiplexing (CWDM).

17. (Original) The data network of claim 15, wherein said WDM is a dense wavelength division multiplexing (DWDM).

18. (Original) The data network of claim 15, comprising a demultiplexer, optically coupled to said optical fiber for decoupling said data packets, in accordance with their wavelengths.

19. (Original) The data network of claim 18, comprising wavelength addressing, wherein each of said optical data packets is routed to a receiving PE, as determined by said distinct wavelength of said optical data packet.

20. (Currently Amended) The data network of claim 19, wherein any one of said ~~second~~ plurality of PEs may be assigned a wavelength address and may act as said receiving PE.

21. (Currently Amended) The data network of claim 20, wherein the number of said ~~second~~ plurality of PEs is less than or equal to the number of said ~~first~~ plurality of cw laser sources, and each of said ~~second~~ plurality of PEs is assigned a wavelength address.

22. (Withdrawn) The data network of claim 13, wherein said second plurality of PEs is arranged in a U plurality clusters, for a multi-cluster design, comprising:

a second plurality of routing switches, each electronically coupled to one of said second plurality of PEs, for receiving an input signal therefrom, and each optically coupled to an output of one of said second plurality of optical modulators, for routing data packets issuing from said optical modulators to a U^2 plurality of output optical couplers, responsive to said input signals from said PEs; each of said U^2 plurality of output optical couplers being designated by an output cluster and an input cluster, and

a U plurality of input optical couplers, for coupling data packets arriving in said U^2 plurality of output optical couplers to a U plurality of optical fibers, each designated by an input cluster.

23. (Withdrawn) The data network of claim 22, comprising a U plurality of demultiplexers, each optically coupled to one of said U plurality of optical fibers, for decoupling said data packets, in accordance with their wavelengths.

24. (Withdrawn) The data network of claim 22, wherein said second plurality is less than or equal to said first plurality times said U, and each of said second plurality of PEs is assigned an address by wavelength and cluster.

25. (Withdrawn) The data network of claim 22, wherein said U plurality of clusters is distributed among different locations.

26. (Withdrawn) The data network of claim 13, wherein said second plurality of PEs is distributed among a Q plurality of locations, comprising:

a Q plurality of output optical couplers, for coupling a plurality of data packets to be transmitted from each location to a Q plurality of output optical fibers;

a central optical coupler, for coupling said Q plurality of output optical fibers to a single, central fiber;

a demultiplexer, optically coupled to said single, central fiber, for decoupling said data packets, in accordance with their wavelengths.

27. (Withdrawn) The data network of claim 26, comprising a Q plurality of input optical couplers, for coupling a plurality of data packets heading to said Q plurality of locations, into a Q plurality of input optical fibers, each leading to one location, the coupling being based on wavelength addresses of PEs in each location.

28. (Withdrawn) The data network of claim 27, comprising a Q plurality of input demultiplexers, each optically coupled to one of said input optical fibers, for decoupling said data packets, in accordance with their wavelengths.

29. (Withdrawn) The data network of claim 13, wherein said laser distribution grid is formed as a plurality of optical fibers.

30. (Original) The data network of claim 13, wherein said laser distribution grid is formed as a multi-mode fiber.

31. (Original) The data network of claim 13, wherein said laser distribution grid is formed as a single-mode fiber.

32. (Original) The laser power grid of claim 13, wherein said at least one optical switch is an electroholographic switch.

33. (Original) The laser power grid of claim 32, wherein said at least one optical switch is operative by electric field multiplexing (EFM).

34. (Currently Amended) The laser power grid of claim 13, wherein at least one of said plurality of optical-switch arrays ~~array~~ includes a plurality of optical switches, equal to said ~~first~~ plurality of light propagations, each optical switch being optically coupled to said laser distribution grid, and each optical switch being adapted for deflecting a single one of said light propagations of said distinct wavelength, responsive to said input signal.

35. (Currently Amended) The laser power grid of claim 34, wherein said a laser distribution grid is formed as one optical fiber, which is coupled to said ~~first~~ plurality of optical switches, with an optical wavelength demultiplexer upstream of said optical-switch array and an optical coupler downstream of said optical-switch array.

36. (Original) The laser power grid of claim 35, comprising an optical coupler for coupling optical fibers along the deflected course of the light propagation.

37. (Original) The data network of claim 13, wherein said each optical switch is adapted to deflect a predetermined portion of said single light propagation of said distinct wavelength.

38. (Original) The laser power grid of claim 13, wherein said laser sources are fixed-wavelength laser sources.

39. (Original) The data network of claim 13, wherein said laser sources are tunable laser sources.

40. (Withdrawn) A method of WDM transmission, incorporating wavelength addressing between a plurality of PEs, distributed among Q locations, comprising:

at each location, coupling a plurality of data packets issuing from said location to a Q plurality of output optical fibers, each leading to a central location;

at said central location, coupling data packets arriving in said Q plurality of output optical fibers to a central optical fiber;

at said central location, optically demultiplexing, by wavelength, data packets issuing from said central optical fiber;

at said central location, coupling data packets which have been optically demultiplexed, by wavelength, to a Q plurality of input optical fibers, each leading to one of said Q locations, said coupling being based on wavelength addressing; and

at each locations, optically demultiplexing, by wavelength, data packets issuing from said input optical fibers, in accordance with their wavelengths.

41. (Withdrawn) A method of WDM transmission, incorporating wavelength addressing between a plurality of PEs, in a multi-cluster data network, of U clusters, comprising:

at each cluster, routing a plurality of data packets issuing from said cluster to a U^2 plurality of output optical couplers, each output optical coupler being designated by two variables: output an input clusters;

coupling said plurality of data packets routed to each coupler to a U^2 plurality of output optical fibers, associated with said U^2 plurality of optical couplers, each output optical fiber being designated by said two variables: output an input clusters;

coupling data packets arriving in said U^2 plurality of output optical fibers to a U plurality of input optical fibers, said coupling being done by wavelength addressing, each input optical fiber being designated by an input cluster, and each leading to the cluster of its designation;

at each cluster, optically demultiplexing, by wavelength, data packets issuing from said input optical fibers, in accordance with their wavelengths.

42. (Currently Amended) A method of data transmitting, comprising:

providing a laser power grid, which comprises:

a ~~first~~ plurality of continuous-work (cw) laser sources, for generating a ~~first~~ plurality of light propagations, each of said light propagations being distinct by its wavelength;

a laser distribution grid, formed as at least one optical fiber, optically coupled to said ~~first~~ plurality of laser sources, for transmitting said ~~first~~ plurality of light propagations; and

a ~~second~~ plurality of optical-switch arrays serving a processing element (PE), each of said optical-switch arrays comprising at least one optical switch, coupled to said laser distribution grid, and adapted for deflecting a predetermined portion of a single one of said light propagations, distinct by its wavelength, responsive to an input signal so that another PE served by another of said plurality of optical-switch arrays is designated;

electronically coupling a ~~second~~ plurality of PEs to said ~~second~~ plurality of optical-switch arrays, each PE being adapted to provide said input signal, for

deflecting said single light propagation of said distinct wavelength, associated with said each PE; and

modulating said single light propagation of said distinct wavelength, responsive to an electronic information of said each PE, for forming an optical data packet of a distinct wavelength for transmission to a PE configured to receive said distinct wavelength~~, associated with said each PE~~.

43. (Currently Amended) A laser power grid, comprising:

a ~~first~~ plurality of continuous-work (cw) laser sources, for generating a first plurality of light propagations, each of said light propagations being distinct by its wavelength;

a laser distribution grid, formed as at least one optical fiber, optically coupled to said ~~first~~ plurality of cw laser sources, for transmitting said first plurality of light propagations; and

a ~~second~~ plurality of optical-switch arrays, each of said optical-switch arrays serving a processing element (PE), comprising at least one optical switch, coupled to said laser distribution grid, and each of said optical-switch arrays being adapted for deflecting predetermined portions of a ~~third~~ second plurality of light propagations, simultaneously, responsive to an input signal so that another PE served by another of said plurality of optical-switch arrays is designated,

wherein said ~~third~~ second plurality of light propagations is not greater than said first plurality of light propagations,

and wherein, the remainder portions of said ~~third~~ second plurality of light propagations and the remainder of said first plurality of light propagations continue to propagate through said laser distribution grid, to the other ones of said ~~second~~ plurality of optical-switch arrays, where predetermined portions of other light propagations, distinct by their wavelength, are deflected, responsive to other input signals.

44. (New) A communication network, comprising:

a plurality of continuous-work (CW) laser source for generating a plurality of light propagations, each distinct by wavelength;

a laser distribution grid, optically coupled to said plurality of CW laser sources and configured for transmitting said plurality of light propagations; and

a plurality of optical-switch units each coupled to said laser distribution grid, serving one of a plurality of processing elements (PEs), and configured communicating data from said served processing element to any other of said plurality of PEs by deflecting a predetermined portion of said light propagations toward a different of said plurality of optical-switch units.

45. (New) The communication network of claim 44, wherein at least one receiver is coupled to said laser distribution grid, said receiver being configured to receive data from only a single wavelength of said plurality of light propagations via said laser distribution grid.

46. (New) The communication network of claim 45, wherein a first said at least one receiver receives data from a first single wavelength, and second said at least one receiver receives data from a second single wavelength that is different from said first single wavelength.

47. (New) The communication network of claim 45, wherein a first said at least one receiver and second said at least one receiver receive data simultaneously via said plurality of light propagations.

48. (New) The laser power grid of claim 1, wherein each of said optical-switch arrays serving a PE is configured to directly address every PE coupled to said laser distribution grid.

49. (New) The laser power grid of claim 1, wherein each of said optical-switch arrays serving a PE is configured to send data simultaneously to another PE coupled to said laser distribution grid via plurality of light propagations.